Notched bar impact testing of metallic materials
using test pieces other than ISO test pieces

DIN 50 115

Prüfung metallischer Werkstoffe; Kerbschlagbiegeversuch; besondere Probenform und Auswerteverfahren

This standard, together with the April 1991 edition of EN 10 045 Part 1, supersedes February 1975 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

See Explanatory notes for connection with International Standards ISO 83 : 1976 and ISO 148 : 1983, published by the International Organization for Standardization.

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In case of doubt, the German-language original should be consulted as the authoritative text.

Dimensions in mm

1 Scope and field of application

This standard specifies test pieces and methods of evaluation for the notched bar impact testing of metallic materials which are not covered in EN 10 045 Part 1.

Note. The specifications of this standard are based on those made in *DVM-Merkblatt* (DVM Instruction sheet) 001 regarding notched bar impact testing (determination of force-time curves and extension-time curves), and on the recommendations made in *Stahl-Eisen-Prüfblatt* (Iron and steel testing sheet) 1315.

2 Concepts

2.1 Fracture appearance

The appearance of the fractured area, as observed macroscopically, is referred to below as the fracture appearance. For the purposes of this standard, a distinction is made between dull appearance and shiny appearance.

2.2 Lateral expansion

For the purposes of this standard, lateral expansion is the measured difference between the width of a broken notched impact test piece in the zone at which the striker meets the notch, and the test piece width prior to the test.

Cf. EN 10 045 Part 1 for further concepts.

3 Test pieces

Test piece types and dimensions that are not included in EN 10 045 Part 1 are shown in figures 1 to 4 and table 1, respectively.

The surface roughness shall be in compliance with ISO 1302.

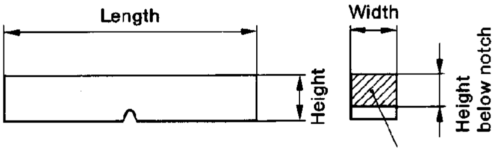


Figure 1. Test piece dimensions (notation)

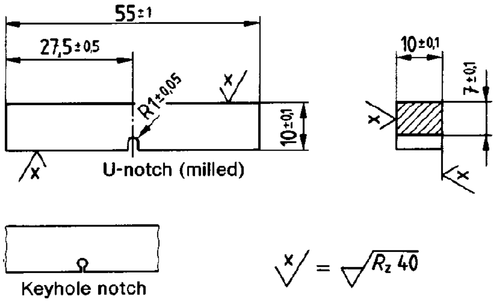


Figure 2. DVM test piece

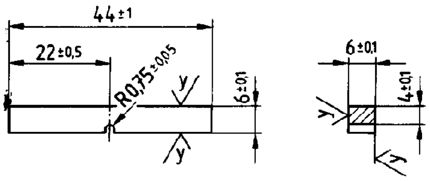


Figure 3. DVMK test piece

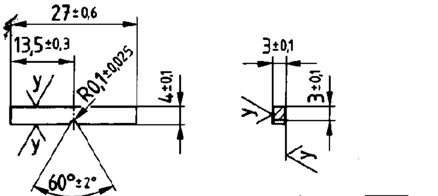
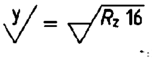


Figure 4. Small test piece



4 Testing machine

For testing DVM test pieces, the striker speed at the moment of impact shall be 5 to 5,5 m/s where the nominal

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Table 1. **Test piece dimensions**

Test piece type: Designation	Test piece type: Symbol	Figure No.	Length	Width	Height	Height below notch	Area under test, in cm²	Radius at base of notch	Angle of notch, in °	Distance between supports
DVM test piece	DVM	2	55 ± 1	$10 \pm 0{,}1$	$10 \pm 0{,}1$	$7 \pm 0{,}1$	0,70	$1 \pm 0{,}05$	–	$40^{+0{,}2}_{0}$
DVMK test piece	DVMK	3	44 ± 1	$6 \pm 0{,}1$	$6 \pm 0{,}1$	$4 \pm 0{,}1$	0,24	$0{,}75 \pm 0{,}05$	–	$30^{+0{,}5}_{0}$
Small test piece	KLST	4	$27 \pm 0{,}5$	$3 \pm 0{,}1$	$4 \pm 0{,}1$	$3 \pm 0{,}1$	0,09	$0{,}1 \pm 0{,}025$	60 ± 2	$22^{+0{,}5}_{0}$
All test pieces shall be rectangular, the angle between adjacent faces being 90° ± 2°.										

machine energy is 50 to 750 J. The speed shall be 3,6 to 4,0 m/s for energies from 7,5 to 50 J, and 2,8 to 3,1 m/s for energies from 0,5 to 4 J.

5 Evaluation

This standard specifies methods of evaluation which are not included in EN 10 045 Part 1.

5.1 Determination of percentage area of dull appearance

Whether the broken faces are dull shall be determined visually or by measurement. The amount of such appearance is normally to be determined with the aid of a fracture appearance chart, such as those illustrated in figure 14 of the American Standard ASTM A 370-89. The result shall be expressed as a percentage of the fractured surface area.

5.2 Determination of lateral expansion

It shall be agreed whether the lateral expansion, *SB*, as a result of impact testing is to be determined.

Determination involves measuring both parts of the broken test piece on either side. Before measurement, any burrs on the edges of the fractured faces shall be carefully removed (using fine emery paper, for example), care being taken not to damage the deformed zone. If the deformed zones are damaged, the test pieces shall not be used for evaluation purposes.

The width of the deformed zone on either side of the two test piece parts shall be measured with a suitable device to an accuracy of 0,01 mm (cf. figure 5). Of the four measurements taken (*SB1* to *SB4*), the larger value of *SB1* and *SB3* shall be added to the larger value of *SB2* and *SB4*, the sum being the lateral expansion, *SB*, and is to be given to the nearest 0,01 mm.

Use of a suitable measuring device will permit the lateral expansion to be determined on the basis of two measurements instead of the four described above. In this method, the increase in width is measured simultaneously on the same side of both parts of the broken test piece (cf. figure 6). This method ensures that the larger of the two values for each side is always obtained, and that the correct values are used for addition. As above, the sum of these two values is the lateral expansion.

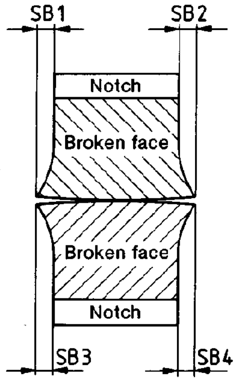

Figure 5. Dimensions to be measured for determination of lateral expansion

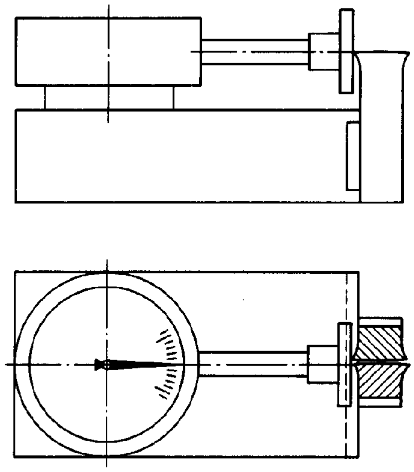

Figure 6. Arrangement for simplified method of determining lateral expansion

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Standards and other documents referred to

EN 10 045 Part 1 Metallic materials; Charpy notched bar impact test; methods of test

ISO 83 : 1976 Steel; Charpy impact test (U-notch)

ISO 148 : 1983 Steel; Charpy impact test (V-notch)

ISO 1302 : 1978 Technical drawings; method of indicating surface texture on drawings

ASTM A 370-89 Standard test methods and definitions for mechanical testing of steel products

DVM-Merkblatt 001 *Meßtechnische Anforderungen beim instrumentierten Kerbschlagbiegeversuch* (Requirements for measuring instruments used for notched bar impact testing)

Stahl-Eisen-Prüfblatt 1315 *Kerbschlagbiegeversuch mit Ermittlung von Kraft und Weg; Empfehlungen zur Durchführung und Auswertung* (Notched bar impact testing including determination of force/extension characteristics; testing and evaluation)

Previous editions

DIN 50115: 09.37, 05.52x, 11.66, 02.75.

Amendments

The following amendments have been made to the February 1975 edition.

a) ISO-V and ISO-U notch test pieces are no longer specified.

b) The distance between supports specified for DVM test pieces has been brought into line with that specified in EN 10 045 Part 1.

c) More detailed specifications have been made for the determination of the percentage of dull appearance and the determination of lateral expansion.

Explanatory notes

This standard has been prepared by Technical Committee 144 *Prüfverfahren mit schlagartiger Beanspruchung für Metalle* of the *Normenausschuß Materialprüfung* (Materials Testing Standards Committee).

Based on the February 1975 edition of this standard, EN 10 045 Part 1 specifies only ISO-U and ISO-V notch test pieces, as covered in ISO 83 and ISO 148, respectively. It was considered necessary to retain these test pieces in the present standard, since they are still used for testing and still referred to in product standards.

The smaller test pieces specified here are often used for research and development purposes, as they permit reproducible results to be obtained.

The methods of evaluation covered in this standard are increasingly required in practice.

International Patent Classification

G 01 N 3/00

G 01 N 33/20

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